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THE UNITED STATES OF AMERICA

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November 03, 2003

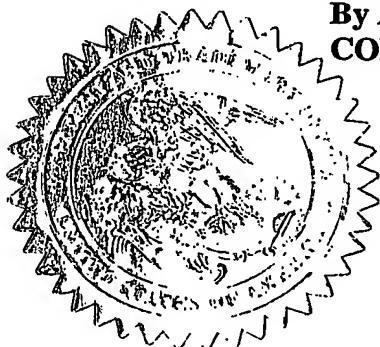
THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 60/414,606

FILING DATE: September 27, 2002

RELATED PCT APPLICATION NUMBER: PCT/US03/30453

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS



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60/414606 . 092702 A/PK

09/27/02

11051 U.S. PTO

PMB:mgs 09/27/02 143424
 Attorney's Matter No. 160-64020
 PATENT

EXPRESS MAIL LABEL NO. EV 078794949 US
 DATE OF DEPOSIT: September 27, 2002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOX PROVISIONAL PATENT APPLICATION
 COMMISSIONER FOR PATENTS
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24197

11040 U.S. PTO
 60/414606

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 C.F.R. § 1.53(c).

TITLE: INTEGRATED ROOF RACK ANTENNA

Inventor(s)/Applicant(s):

Tornatta, Jr.	Paul	A.	Vancouver, Washington
Last	First	MI	City, State or Foreign Country and City
Grant	Gary	W.	Oregon City, Oregon
Last	First	MI	City, State or Foreign Country and City
Young	Jonathan		Vancouver, Washington
Last	First	MI	City, State or Foreign Country and City

- ☒ 26 pages of specification are enclosed.
- ☒ Provisional Filing Fee Amount:
☒ \$160, large entity
- ☒ A check in the amount of \$160.00 to cover the filing fee is enclosed.
- ☒ The Director is hereby authorized to charge any additional fees which may be required in connection with the filing of this provisional application filed herewith, or credit overpayment, to Account No. 02-4550. A copy of this sheet is enclosed.
- ☒ Please return the enclosed postcard to confirm that the items listed above have been received.
- ☒ Address all telephone calls to Patrick M. Bible at telephone number (503) 226-7391.

60414606.092702

PMB:mgs 09/27/02 143424
Attorney's Matter No. 160-64020
PATENT

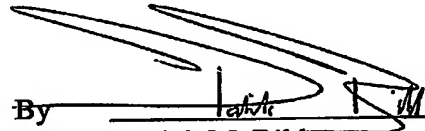
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DATE OF DEPOSIT: September 27, 2002

☒ Address all correspondence to:

KLARQUIST SPARKMAN, LLP
One World Trade Center, Suite 1600
121 S.W. Salmon Street
Portland, OR 97204

Respectfully submitted,

KLARQUIST SPARKMAN, LLP


By _____
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cc: Docketing

Tornetta et al.
Title: INTEGRATED ROOF RACK ANTENNA
Express Mail: EV 078794949 US
Mailed: September 27, 2002
*Attorney Matter No. 160-64020

1

Automotive Accessory Product with Integrated Communications Antenna Technology



60714606,092702

Concept

- Automotive accessory - in this case a roof mounted rack intended for carrying cargo - with embedded advanced communications antennas
- Communications bands include, but are not limited to - AMPS, PCS, GPS, SDARS, DAB, GSM, ISM, AM/FM, TV



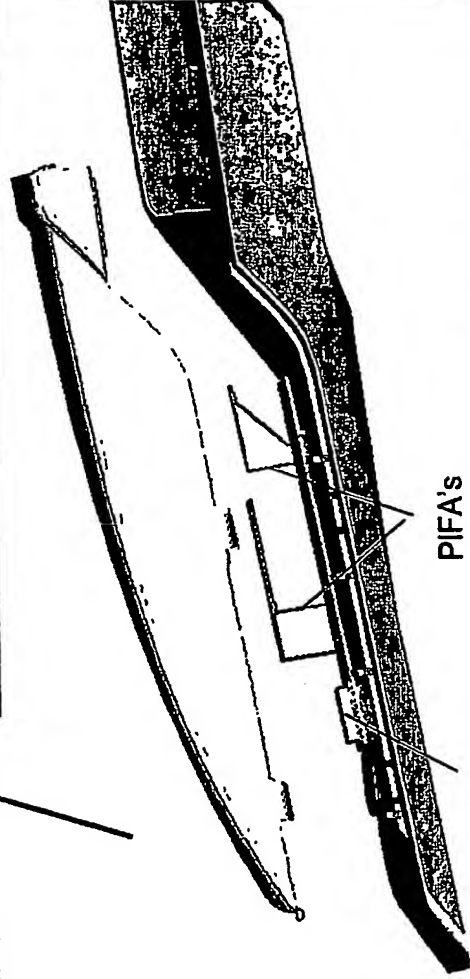
Telematics Implementation Integrated Roof Rack

FEATURES / BENEFITS

- Tri-band performance: AMPS/PCS/GPS
- Improved Aesthetics: completely hidden antenna
- Improved Reliability / Warranty: antenna protected by rack cover -very robust mechanical integration
- Reduce vandalism
- Reduce APEI

APPLICATIONS:

- Personal Calling
- Navigation
- Stolen Vehicle Recovery
- Remote Diagnostics
- Location Commerce



GPS Module

PIFA's



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4

Antenna Gain Study – Integrated Roof Rack Antenna



Radiall / SportRack Proprietary Information



60414606.092702

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Express Mail: EV 078794949 US
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Attorney Matter No. 160-64000

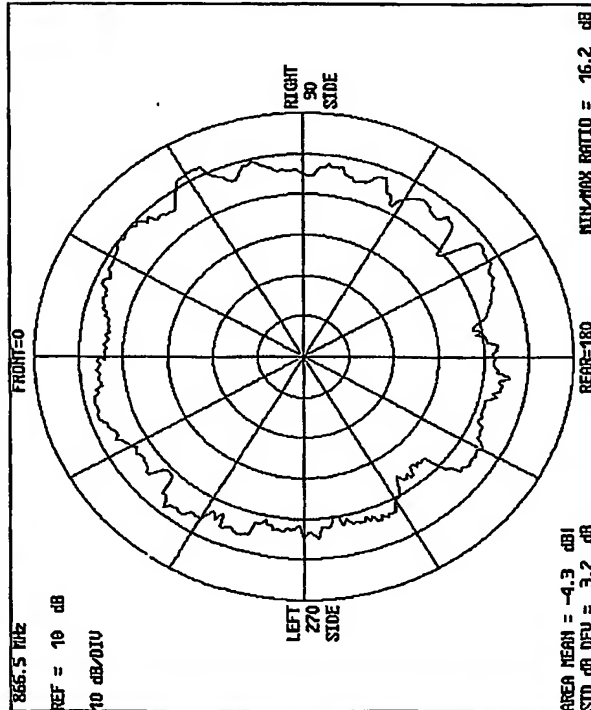
AMPS Performance with Luggage Carrier - 2003 Trailblazer 5

- OnStar gain specification is -3 dBi in AMPS
- 2 of 14 frequencies tested demonstrate compliant performance
- 8 of 14 frequencies demonstrate marginal performance
- Mean Gain is -4.0 dBi within band

DOCUMENTATION 18:52:37

Pattern.....1
Frequency.....850 MHz Span.....100 MHz
UNIT TESTED.....83 CHEVROLET
Mfg./Model.....TRAIL BLAZER
ID Number.....
Antenna Type.....TRI-BAND 1189
Antenna Location.....PASSENGER SIDE ROOF
WITH LUGGAGE CARRIER

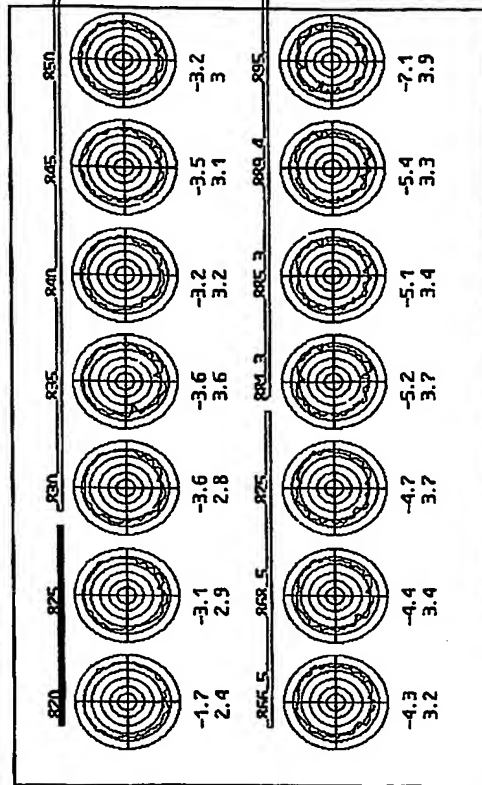
RF DETECTOR.....SPECTRUM ANALYZER
Mfg./Model.....Anritsu MS2652A
Resolution BW.....100 kHz
Detector Function.....Peak
RF SOURCE.....LAB SIGNAL
Mfg./Model.....Anritsu MH682A1
Modulation.....NONE
RF Level.....0 dBm
Transmit Antenna.....JRP 50-1000 MHz NLP
Polarization.....JRP CHL
Range.....150 ft.
Press any key to continue.



Radial / SportRack Proprietary Information



Radial Automotive Division



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Mailed: September 27, 2002
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PCS Performance with Luggage Carrier - 2003 Trailblazer 6

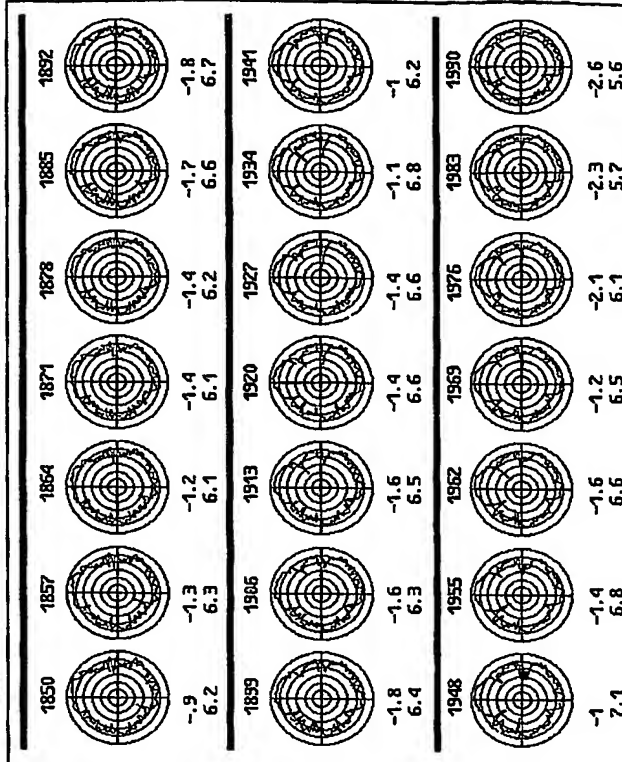
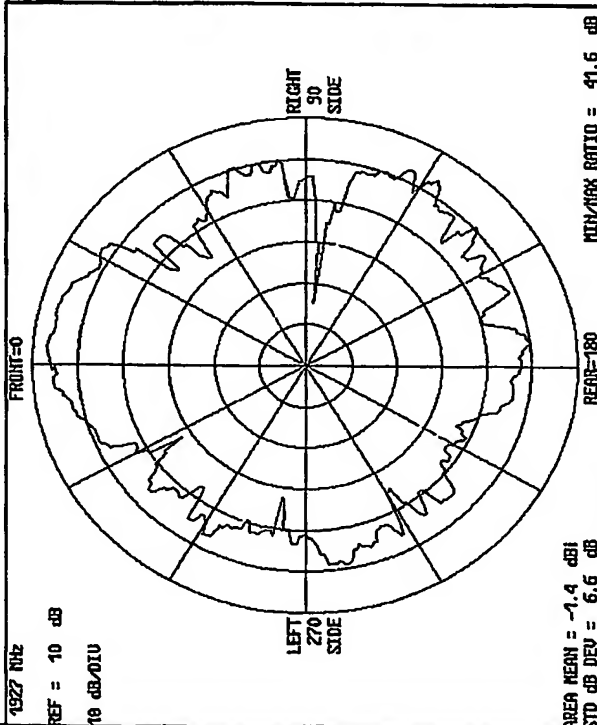
- OnStar gain specification is -3 dBi in PCS
- 21 of 21 frequencies tested demonstrate compliant performance
- 0 of 21 frequencies demonstrate marginal performance
- Mean Gain is -1.5 dBi within band



68-27-2002 DOCUMENTATION 18:58:41

Pattern..... 2
Frequency..... 1920 MHz Span..... 140 MHz
UNIT TESTED..... 03 CHEVROLET
Reg./Model..... TRAIL BLAZER
ID Number.....
Antenna Type..... TRI-BAND IBSA
Antenna Location..... PASSENGER SIDE ROOF
WITH LUGGAGE CARRIER

RP DETECTOR..... SPECTRUM ANALYZER
Reg./Model..... Anritsu MS2681B
Bandwidth..... 100 MHz
Detector Function..... Peak
RP SOURCE..... LAB SIGNAL
Reg./Model..... Anritsu M1688A1
Modulation..... NONE
RP Level..... 0 dBm
Transmit Antenna..... JEP NOL 15CM HORN M1
Polarization..... VERTICAL
Height..... 4 Ft.
Range..... 150 Ft.
Press any key to continue.



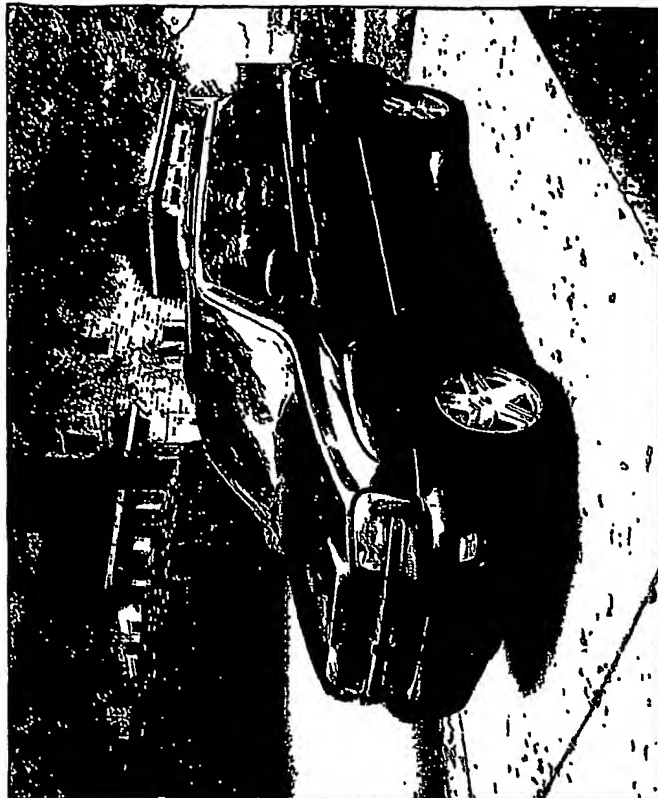
Radiall / SportRack Proprietary Information

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Radiall Automotive Division

10/11/2002 09:41
Title: INTEGRATED ROOF RACK ANTENNA
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Mailed: September 27, 2002
Attorney Matter No. 160-64020

AMPS Performance without Luggage Carrier - 2003 Trailblazer

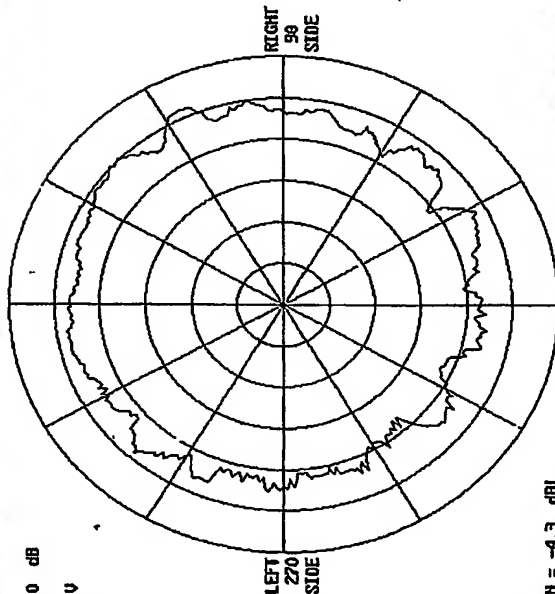
- OnStar gain specification is -3 dBi in AMPS
- 2 of 14 frequencies tested demonstrate compliant performance
- 9 of 14 frequencies demonstrate marginal performance
- Mean Gain is -3.9 dBi within band



88-27-2882 DOCUMENTATION 19:12:12
Pattern..... 4
Frequency..... 850 MHz Span..... 100 MHz
UNIT TESTED..... 03 CHEVROLET
RF Model..... TRAILBLAZER
LP Number.....
Antenna 1999..... FBI-BAND 1B99
Antenna 1999..... PASSENGER SIDE ROOF
LUGGAGE CARRIER REMOVED
RF DETECTOR..... SPECTRUM ANALYZER
RF Model..... Anritsu MS2681A
Resolution BW..... 100 KHz
Detector Function..... Peak
RF SOURCE..... LAB 81GNAL
RF Model..... Anritsu MH68881
Modulation..... NONE
RF Level..... 0 dBm
Transmit Antenna..... JEP 50-1000 MHz KLP
Polarization..... UPLINK CAL
Height..... 150 ft.
Peak: any key to continue:

856.5 MHz FRONT=0

REF = 10 dB
10 dB/DIV



POWER MEAN = -4.3 dBi
STD dB DEV = 3.2 dB

REAR=180 TURN/RATIO = 15.3 dB



Radiall / SportRack Proprietary Information

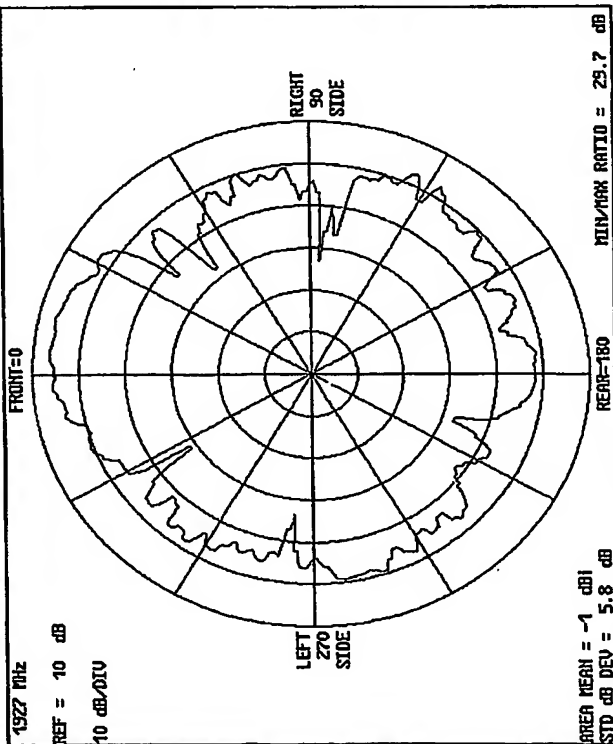


60414606, 09/27/02

PCS Performance without Luggage Carrier - 2003 Trailblazer

- OnStar gain specification is -3 dBi in PCS
- 21 of 21 frequencies tested demonstrate compliant performance
- 0 of 21 frequencies demonstrate marginal performance
- Mean Gain is -1.3 dBi within band

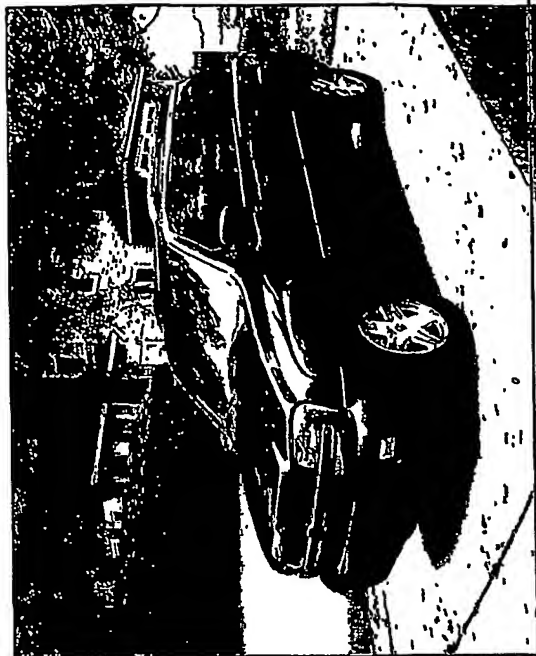
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 Frequency..... 1920 Mhz Span..... 140 Mhz
 UNIT TESTED..... 03 CHRYSLER
 Mfg./Model..... TRAILBLAZER
 ID Number.....
 Antenna.....
 Antenna Location.....
 LUGGAGE CARRIER REMOVED
 RP DETECTOR..... SPECTRUM ANALYZER
 Mfg./Model..... Anritsu MS2681A
 Resolution BW..... 100 Mhz
 Detector Function..... Peak
 RP SOURCE..... LAB SIGNAL
 Mfg./Model..... Anritsu MS680A1
 Modulation..... NONE
 RP Level..... 0 dBm
 Transmit Antenna..... JWB NPL 15CM HORN #1
 Polarization..... VERTICAL
 Height..... 4 ft.
 Range..... 150 ft.
 Press any key to continue.



Radiall / SportRack Proprietary Information



Radiall Automotive Division



1859	1857	1854	1871	1878	1885	1892	1899	1906	1913	1920	1927	1934	1941	1948	1955	1962	1969	1976	1983	1990
-9.6	-1.3	-1.2	-1.4	-1.4	-1.6	-1.6	-1.4	-1.3	-1.3	-1.1	-1	-1.7	-8	-7	-1.1	-1.3	-9	-1.7	-1.9	-2.2
6	5.8	5.7	5.9	5.9	5.5	5.5	5.4	5.5	5.8	6	5.8	5.6	5.1	5.5	5.5	5.3	5.5	4.9	4.5	4.5

Comments

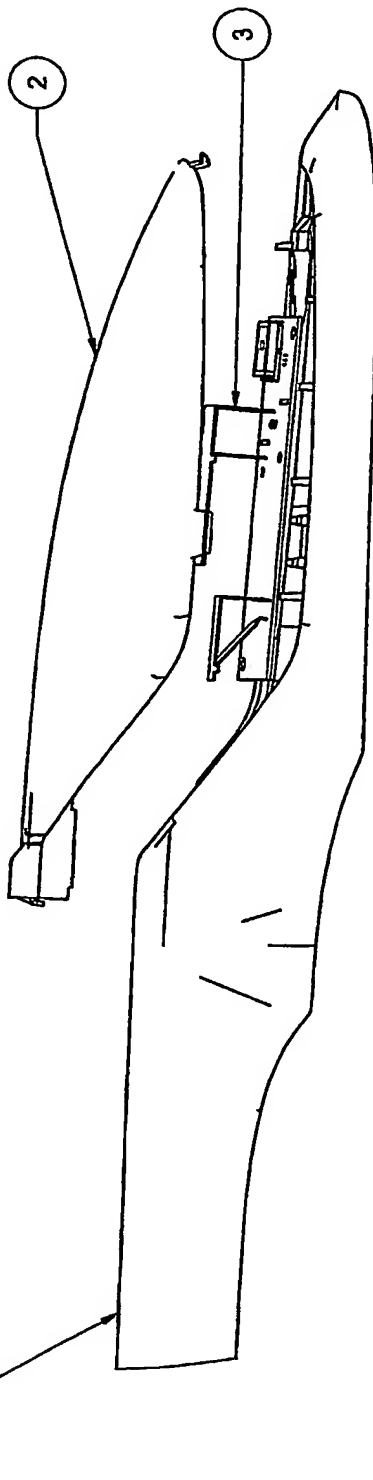
- This implementation shows an integrated Telematics antenna. The concept can easily be extended to SDARS (Satellite Radio), AM/FM, TV or any other communications band where the location and size of the roof rack provide adequate performance



60414606-092704

Tomalia et al.
 Title: INTEGRATED ROOF RACK ANTENNA
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 Mailed: September 27, 2002
 Attorney Matter No. 160-64020

CRITICAL POINTS		DESCRIPTION/TITLE		PART NUMBER	
		TRILBAND TELEMATICS ANTENNA		ROOF RACK INTEGRATION	
ITEM	QTY	PART NUMBER		DESCRIPTION	
1	1			ROOF RACK SIDE RAIL	
2	1			ROOF RACK SIDE RAIL FRONT COVER	
3	1			ANTENNA	

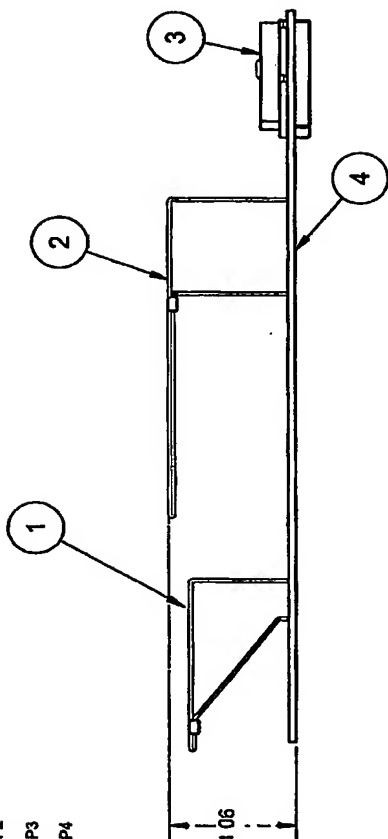


REV	ECN#	DESCRIPTION	BY	DATE	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	Release Date	Project Number	Weight (G)
					(1) Decimal Dim 0.0 ±0.1 (2) Decimal Dim 0.00 ±0.03 (3) Decimal Dim 0.000 ±0.005	External Spec		
					Angular Dim ±2°			
					Surface Finish			
					✓			

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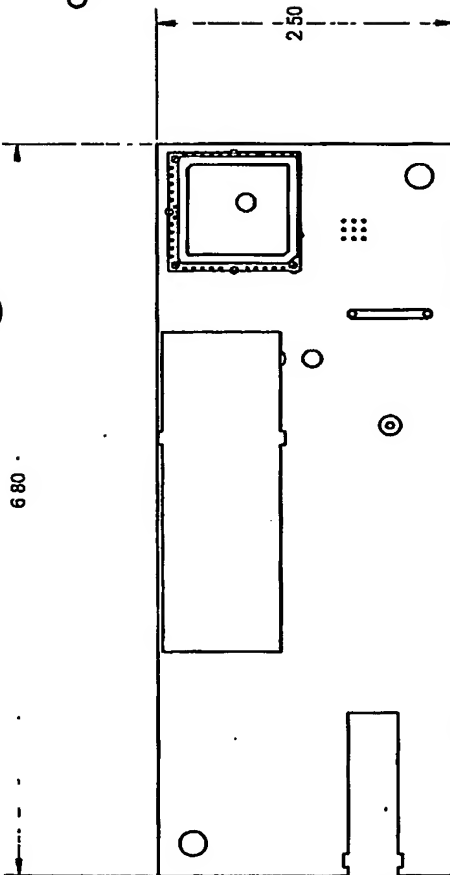
Tomalia et al.
 Title: INTEGRATED ROOF RACK ANTENNA
 Express Mail: EV 078794949 US
 Mailed: September 27, 2002
 Attorney Matter No. 160-64020

CRITICAL POINTS		DESCRIPTION/TITLE	PART NUMBER	REV
P1		TRI-BAND ANTENNA FOR ROOF RACK INTEGRATION		
P2				
P3				
P4				
		ITEM QTY	DESCRIPTION	
		1 1	PCS LOOP RADIATOR	
		2 1	AMPS PIFA RADIATOR	
		3 1	GPS MODULE	
		4 1	PRINTED CIRCUIT BOARD	



6 80

COAX CABLES AND CONNECTORS NOT SHOWN



REV	ECN	DESCRIPTION	BY	DATE	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES TOLERANCES ON	Release Date	Project Number	Weight (g)
					(1) Decimal Dim			
					(2) Decimal Dim			
					(3) Decimal Dim			
					Angular Dim			
					Surface Finish			

RADIAL/LARSEN

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 VANCOUVER, WA 98682

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Scale: 1:1
 Sheet 9 of 14

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Mailed: September 27, 2002
Attorney Matter No. 160-64020



Tornatta et al.
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Attorney Matter No. 160-64020

144-14606-092702



Torres et al.
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Express Mail: EV 078794949 US
Mailed: September 27, 2002
Attorney Master No. 160-64020

60414606 092702



Tomatta et al.
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Mailed: September 27, 2002
Attorney Matter No. 160-64020

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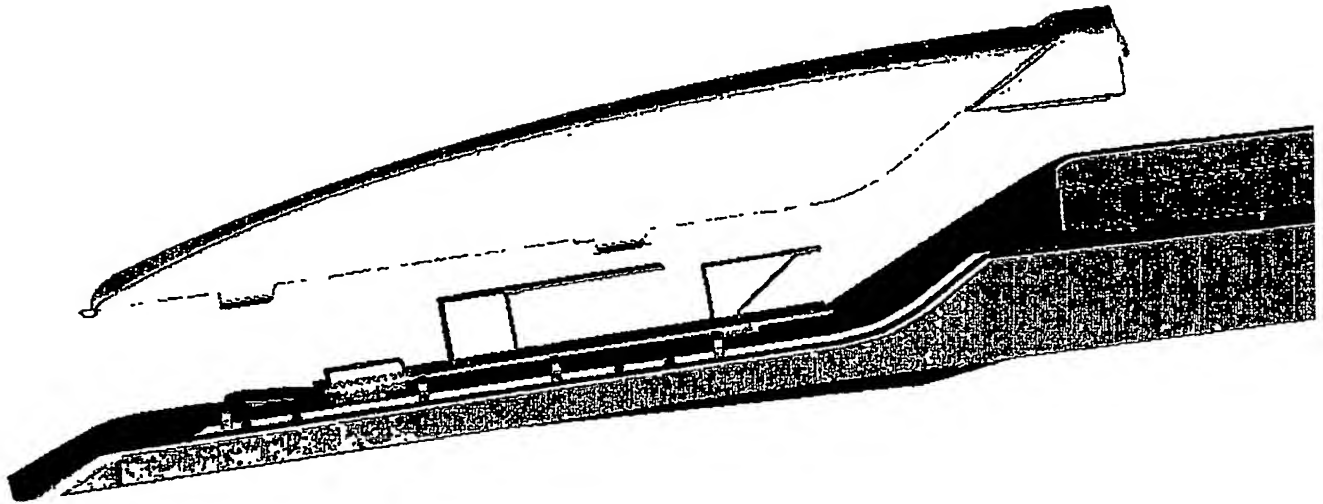
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14606 092702



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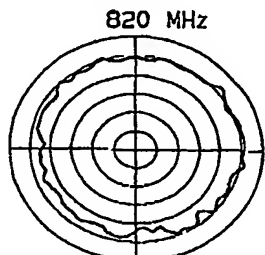
JEF Consultant, Inc.

Belleville, Michigan Phone: (734) 482-5505
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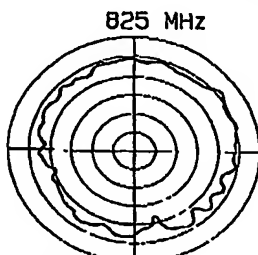
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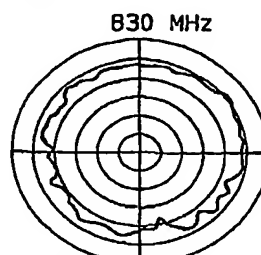
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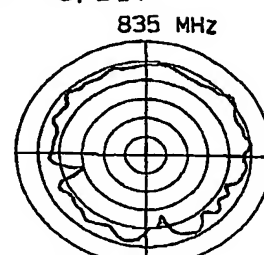
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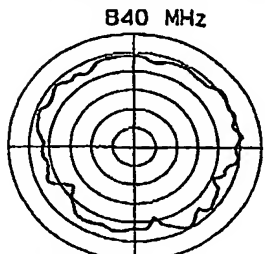
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M/M Ratio = 15.7



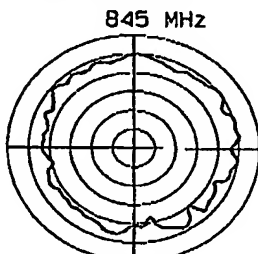
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Std dB Dev = 2.8
M/M Ratio = 14.1



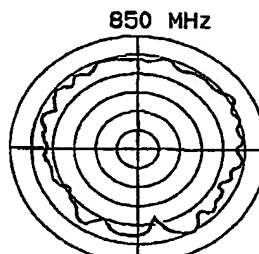
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Std dB Dev = 3.6
M/M Ratio = 21.7



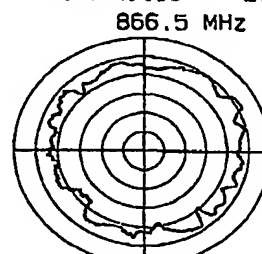
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Std dB Dev = 3.2
M/M Ratio = 15.3



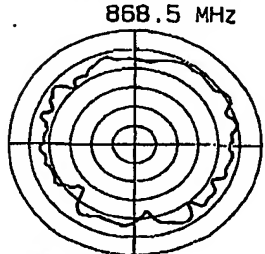
Area Mean = -3.5
Std dB Dev = 3.1
M/M Ratio = 13.6



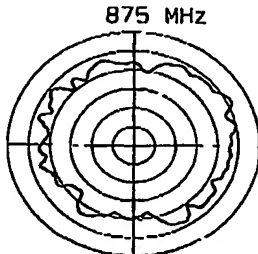
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Std dB Dev = 3
M/M Ratio = 15.6



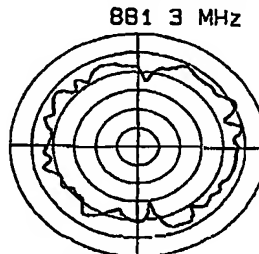
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M/M Ratio = 16.2



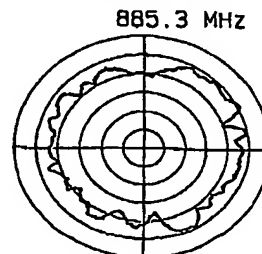
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Std dB Dev = 3.4
M/M Ratio = 18.1



Area Mean = -4.7
Std dB Dev = 3.7
M/M Ratio = 16.9



Area Mean = -5.2
Std dB Dev = 3.7
M/M Ratio = 19.9



Area Mean = -5.1
Std dB Dev = 3.4
M/M Ratio = 15.5

Mean of Ind. Area Means... -4 dB_i
Std dB Dev of Area Means... .4 dB

Mean of Ind. MM Ratios.... 17.7 dB
Std dB Dev of M/M Ratios... 5.1 dB
Mean of Ind Std dB Dev's... 3.3 dB

UNIT TESTED.... '03 CHEVROLET
Mfg./Model.... TRAIL BLAZER
Antenna Type... TRI-BAND IRRRA
Comments... WITH LUGGAGE CARRIER

ID Number.....
Ant. Location... PASSENGER SIDE ROOF RACK

RF DETECTOR... SPECTRUM ANALYZER
Resolution BW... 100 KHz

Mfg./Model.... Anritsu MS2601A
Detector Fn... Peak

RF SOURCE... LAB SIGNAL
Transmit Ant... JEF 50-1000 MHz XLP
Height..... 10 Ft.

Mfg./Model... Anritsu MH680A1
Polarization... VERTICAL
Range..... 150 Ft.

Tornatta et al.
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Express Mail: EV 078794949 US
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14606 1092702

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Belleville, Michigan

Phone: (734) 482-5505

DATE... 08-27-2002

TIME.....18: 52: 37

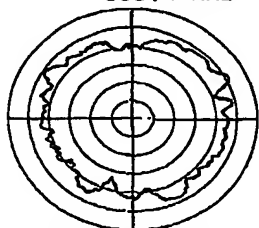
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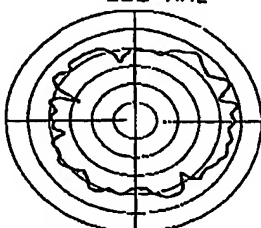
10 dB/DIV

889.4 MHz



Area Mean = -5.4
Std dB Dev = 3.3
M/M Ratio = 18

895 MHz



Area Mean = -7.1
Std dB Dev = 3.9
M/M Ratio = 22

Mean of Ind. Area Means...-4 dB_i
Std dB Dev of Area Means... .4 dB

UNIT TESTED ..'03 CHEVROLET
Mfg./Model ..TRAIL BLAZER
Antenna Type TRI-BAND IRRRA
Comments..... WITH LUGGAGE CARRIER

RF DETECTOR...SPECTRUM ANALYZER
Resolution BW . 100 KHz

RF SOURCE.....LAB SIGNAL
Transmit Ant. JEF 50-1000 MHz XLP
Height.....10 Ft.

Mean of Ind. MM Ratios... 17.7 dB
Std dB Dev of M/M Ratios... 5.1 dB
Mean of Ind Std dB Dev's... 3.3 dB

ID Number.....
Ant. Location...PASSENGER SIDE ROOF RACK

Mfg./Model.....Anritsu MS2601A
Detector Fn....Peak

Mfg./Model.....Anritsu MH580A1
Polarization...VERTICAL
Range.....150 Ft.

Tornatta et al.
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Phone: (734) 482-5505

DATE: .08-27-2002

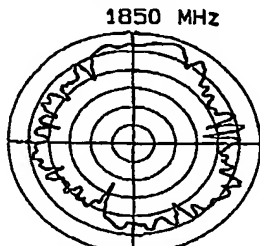
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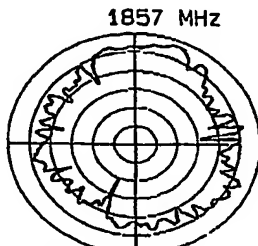
REF = 10dBi

FRONT=0

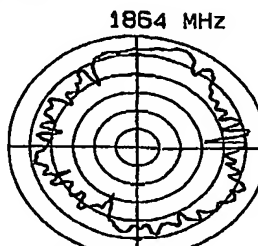
10 dB/DIV



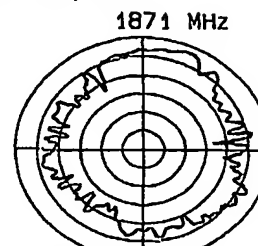
Area Mean = -.9
Std dB Dev = 6.2
M/M Ratio = 33.8



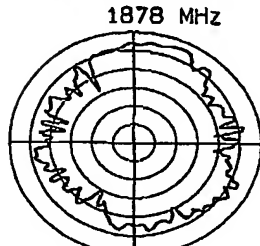
Area Mean = -1.3
Std dB Dev = 6.3
M/M Ratio = 37.3



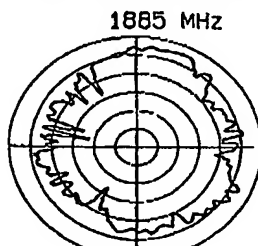
Area Mean = -1.2
Std dB Dev = 6.1
M/M Ratio = 29



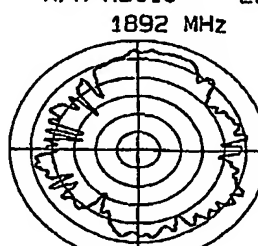
Area Mean = -1.4
Std dB Dev = 6.1
M/M Ratio = 22.9



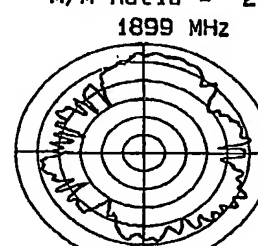
Area Mean = -1.4
Std dB Dev = 6.2
M/M Ratio = 25.8



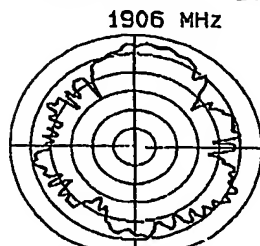
Area Mean = -1.7
Std dB Dev = 6.6
M/M Ratio = 32.8



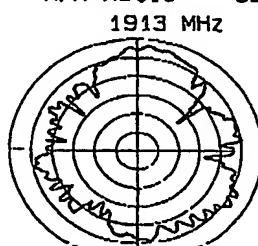
Area Mean = -1.8
Std dB Dev = 6.7
M/M Ratio = 27.6



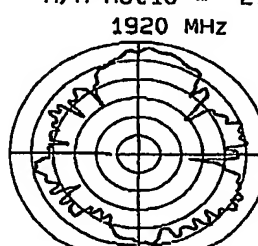
Area Mean = -1.8
Std dB Dev = 6.4
M/M Ratio = 25.8



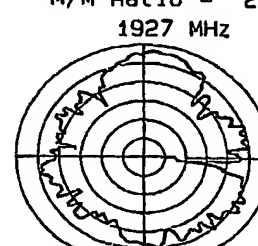
Area Mean = -1.6
Std dB Dev = 6.3
M/M Ratio = 24.8



Area Mean = -1.6
Std dB Dev = 6.5
M/M Ratio = 32.1



Area Mean = -1.4
Std dB Dev = 6.6
M/M Ratio = 33.2



Area Mean = -1.4
Std dB Dev = 6.6
M/M Ratio = 41.6

Mean of Ind. Area Means ... -1.5 dBi
Std dB Dev of Area Means4 dB

Mean of Ind. MM Ratios ... 34.3 dB
Std dB Dev of M/M Ratios ... 5.1 dB
Mean of Ind Std dB Dev's ... 6.4 dB

UNIT TESTED....'03 CHEVROLET
Mfg /Model.....TRAIL BLAZER
Antenna Type TRI-BAND IRRR
Comments.... WITH LUGGAGE CARRIER

ID Number.....
Ant Location...PASSENGER SIDE ROOF RACK

RF DETECTOR....SPECTRUM ANALYZER
Resolution BW.. 100 KHz

Mfg./Model.....Anritsu MS2601A
Detector Fn....Peak

RF SOURCE... LAB SIGNAL
Transmit Ant...JEF NRL 15CM HORN #1
Height .. 4 Ft

Mfg./Model... Anritsu MH680A1
Polarization...VERTICAL
Range.....150 Ft.

Tomatta et al.
Title: INTEGRATED ROOF RACK ANTENNA
Express Mail: EV 078794949 US
Mailed: September 27, 2002
Attorney Matter No. 160-64020

11:14:14606-092702

JEF Consultant, Inc.

Belleville, Michigan

Phone: (734) 482-5505

DATE.....08-27-2002

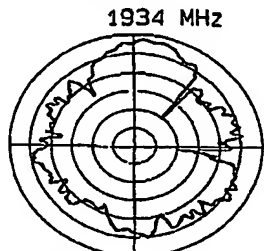
TIME. .18: 58. 41

PATTERN... 002

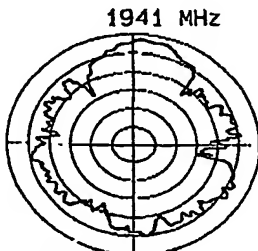
REF = 10dB_i

FRONT=0

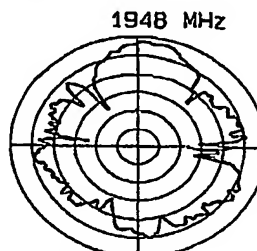
10 dB/DIV



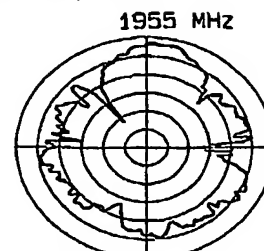
Area Mean = -1.1
Std dB Dev = 6.8
M/M Ratio = 37.9



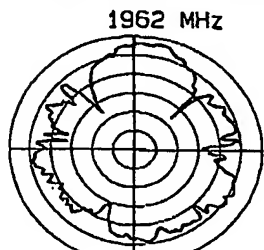
Area Mean = -1
Std dB Dev = 6.2
M/M Ratio = 26.9



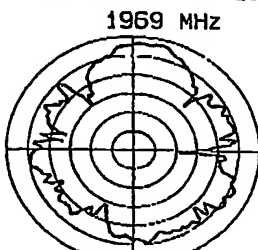
Area Mean = -1
Std dB Dev = 7.1
M/M Ratio = 33.8



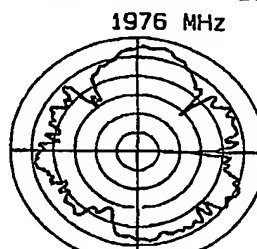
Area Mean = -1.4
Std dB Dev = 6.8
M/M Ratio = 39.2



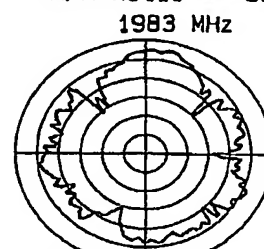
Area Mean = -1.6
Std dB Dev = 6.6
M/M Ratio = 33



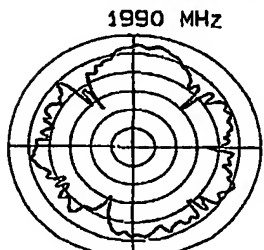
Area Mean = -1.2
Std dB Dev = 6.5
M/M Ratio = 35.9



Area Mean = -2.1
Std dB Dev = 6.1
M/M Ratio = 28.6



Area Mean = -2.3
Std dB Dev = 5.7
M/M Ratio = 26.2



Area Mean = -2.6
Std dB Dev = 5.6
M/M Ratio = 30.4

Mean of Ind. Area Means...-1.5 dB_i
Std dB Dev of Area Means... 4 dB

UNIT TESTED ...'03 CHEVROLET
Mfg./Model. ...TRAIL BLAZER
Antenna Type...TRI-BAND IIRA
Comments.....WITH LUGGAGE CARRIER

RF DETECTOR....SPECTRUM ANALYZER
Resolution BW.. 100 KHz

RF SOURCE.....LAB SIGNAL
Transmit Ant...JEF NRL 15CM HORN #1
Height.....4 Ft.

Mean of Ind. MM Ratios.... 34.3 dB
Std dB Dev of M/M Ratios.. 5.1 dB
Mean of Ind Std dB Dev's.. 6.4 dB

ID Number.....
Ant. Location..PASSENGER SIDE ROOF RACK

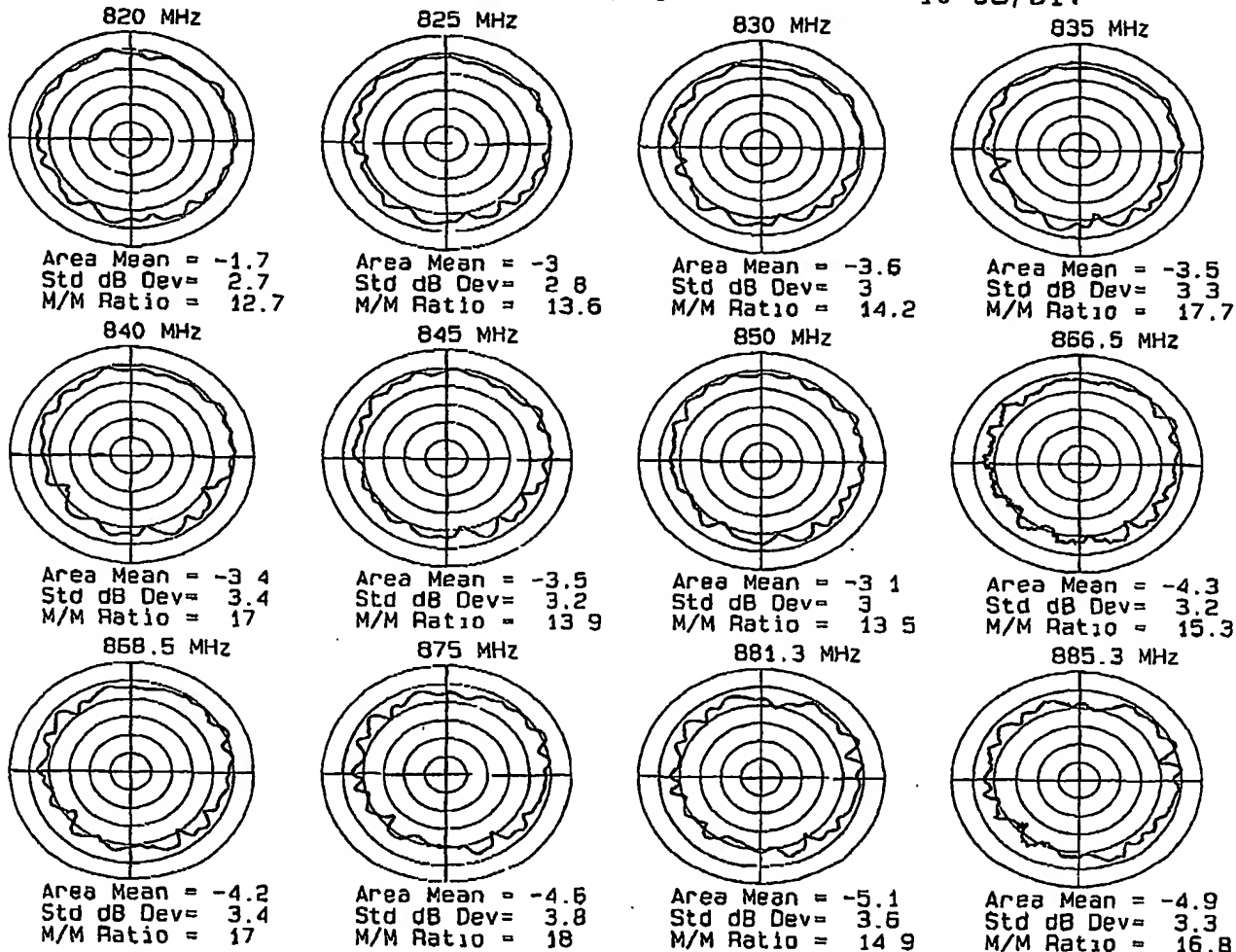
Mfg./Model.....Anritsu MS2601A
Detector Fn Peak

Mfg./Model.....Anritsu MH680A1
Polarization...VERTICAL
Range.....150 Ft.

JEF Consultant, Inc.

Belleville, Michigan Phone: (734) 482-5505
 DATE.... 08-27-2002 TIME.....19:12:12 PATTERN.....004

REF = 10dBi FRONT=0 10 dB/DIV



Mean of Ind. Area Means...-3.9 dB
 Std dB Dev of Area Means... 4 dB

UNIT TESTED... '03 CHEVROLET
 Mfg./Model... TRAIL BLAZER
 Antenna Type... TRI-BAND IRRA
 Comments... LUGGAGE CARRIER REMOVED

RF DETECTOR... SPECTRUM ANALYZER
 Resolution BW.. 100 KHz

RF SOURCE... LAB SIGNAL
 Transmit Ant... JEF 50-1000 MHz XLP
 Height... 10 Ft

Mean of Ind. MM Ratios... 16.1 dB
 Std dB Dev of M/M Ratios... 5.1 dB
 Mean of Ind Std dB Dev's... 3.3 dB

ID Number...
 Ant. Location... PASSENGER SIDE ROOF RACK

Mfg./Model... Anritsu MS2601A
 Detector Fn... Peak

Mfg./Model... Anritsu MH680A1
 Polarization... VERTICAL
 Range... 150 Ft.

Tomata et al.
Title: INTEGRATED ROOF RACK ANTENNA
Express Mail: EV 078794949 US
Mailed: September 27, 2002
Attorney Matter No. 160-64020

144686 092702

JEF Consultant, Inc.

Belleville, Michigan

Phone: (734) 482-5505

DATE.. 08-27-2002

TIME.....19. 06: 46

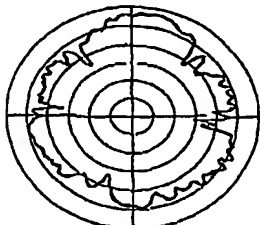
PATTERN.....003

REF = 10dBi

FRONT=0

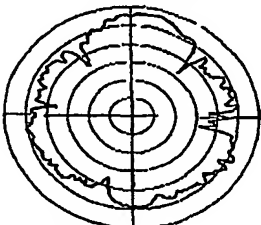
10 dB/DIV

1934 MHz



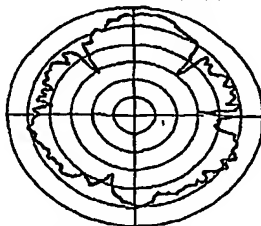
Area Mean = -.7
Std dB Dev = 5.6
M/M Ratio = 27.9

1941 MHz



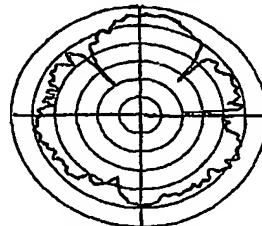
Area Mean = -.8
Std dB Dev = 5.1
M/M Ratio = 24.9

1948 MHz



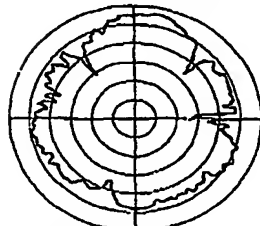
Area Mean = -.7
Std dB Dev = 5.5
M/M Ratio = 28

1955 MHz



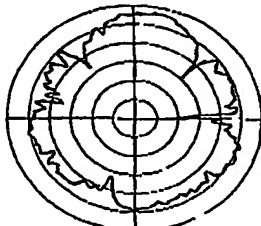
Area Mean = -1.1
Std dB Dev = 5.5
M/M Ratio = 37

1962 MHz



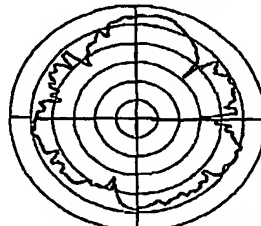
Area Mean = -1.3
Std dB Dev = 5.3
M/M Ratio = 29.1

1969 MHz



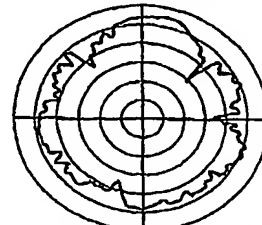
Area Mean = -.9
Std dB Dev = 5.5
M/M Ratio = 37.8

1976 MHz



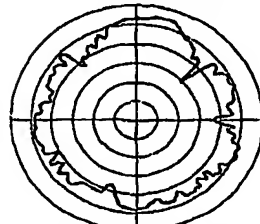
Area Mean = -1.7
Std dB Dev = 4.9
M/M Ratio = 25.6

1983 MHz



Area Mean = -1.9
Std dB Dev = 4.5
M/M Ratio = 26.3

1990 MHz



Area Mean = -2.2
Std dB Dev = 4.3
M/M Ratio = 25.6

Mean of Ind. Area Means.. -1.3 dB
Std dB Dev of Area Means.. .4 dB

UNIT TESTED....'03 CHEVROLET
Mfg./Model... TRAIL BLAZER
Antenna Type... TRI-BAND IRRRA
Comments... LUGGAGE CARRIER REMOVED

RF DETECTOR... SPECTRUM ANALYZER
Resolution BW.. 100 KHz

RF SOURCE..... LAB SIGNAL
Transmit Ant... JEF NRL 15CM HORN #1
Height..... 4 Ft.

Mean of Ind. MM Ratios ... 31.2 dB
Std dB Dev of M/M Ratios ... 5.1 dB
Mean of Ind Std dB Dev's.. 5.5 dB

ID Number.....
Ant. Location.. PASSENGER SIDE ROOF RACK

Mfg./Model.... Anritsu MS2601A
Detector Fn.. Peak

Mfg./Model.... Anritsu MH680A1
Polarization... VERTICAL
Range..... 150 Ft.

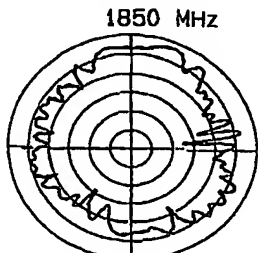
JEF Consultant, Inc.

Belleville, Michigan Phone: (734) 482-5505
 DATE... 08-27-2002 TIME.....19:06.46 PATTERN.....003

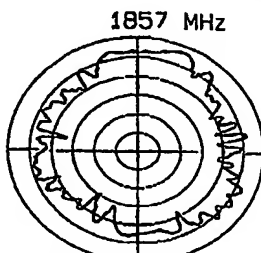
REF = 10dB₁

FRONT=0

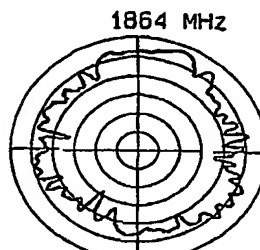
10 dB/DIV



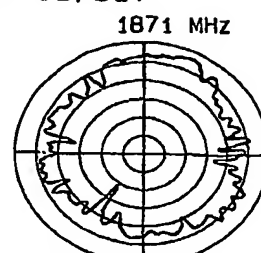
Area Mean = -.9
 Std dB Dev = 6
 M/M Ratio = 31.6



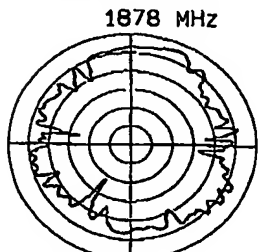
Area Mean = -1.3
 Std dB Dev = 5.8
 M/M Ratio = 27.6



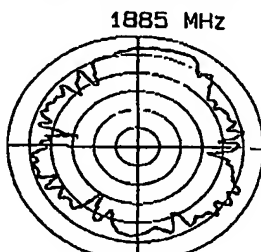
Area Mean = -1.2
 Std dB Dev = 5.7
 M/M Ratio = 29.3



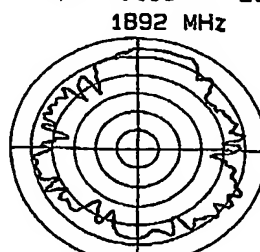
Area Mean = -1.4
 Std dB Dev = 5.9
 M/M Ratio = 35.3



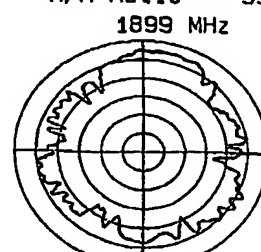
Area Mean = -1.4
 Std dB Dev = 5.9
 M/M Ratio = 33.7



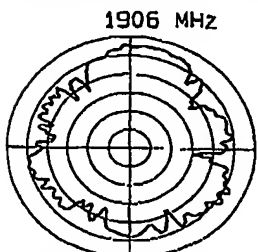
Area Mean = -1.6
 Std dB Dev = 5.5
 M/M Ratio = 27.6



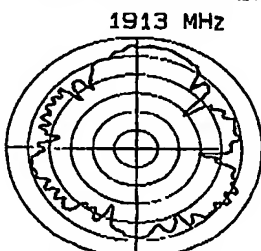
Area Mean = -1.6
 Std dB Dev = 5.5
 M/M Ratio = 22



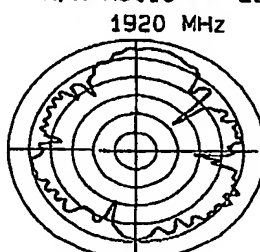
Area Mean = -1.4
 Std dB Dev = 5.4
 M/M Ratio = 21.3



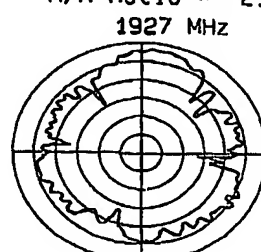
Area Mean = -1.3
 Std dB Dev = 5.5
 M/M Ratio = 25



Area Mean = -1.3
 Std dB Dev = 5.8
 M/M Ratio = 27.4



Area Mean = -1.1
 Std dB Dev = 6
 M/M Ratio = 33.3



Area Mean = -1
 Std dB Dev = 5.8
 M/M Ratio = 29.7

Mean of Ind. Area Means... -1.3 dB₁
 Std dB Dev of Area Means... .4 dB

Mean of Ind. MM Ratios... 31.2 dB
 Std dB Dev of M/M Ratios... 5.1 dB
 Mean of Ind Std dB Dev's... 5.5 dB

UNIT TESTED... '03 CHEVROLET
 Mfg./Model... TRAIL BLAZER
 Antenna Type... TRI-BAND IRRA
 Comments... LUGGAGE CARRIER REMOVED

ID Number.....
 Ant. Location... PASSENGER SIDE ROOF RACK

RF DETECTOR... SPECTRUM ANALYZER
 Resolution BW 100 KHz

Mfg./Model... Anritsu MS2601A
 Detector Fn... Peak

RF SOURCE... LAB SIGNAL
 Transmit Ant... JEF NRL 15CM HORN #1
 Height... 4 Ft.

Mfg./Model... Anritsu MH580A1
 Polarization... VERTICAL
 Range... 150 Ft.

Tomatta et al.
Title: INTEGRATED ROOF RACK ANTENNA
Express Mail: EV 078794949 US
Mailed: September 27, 2002
Attorney Matter No. 160-64020

114606 092702

JEF Consultant, Inc.

Belleville, Michigan

Phone: (734) 482-5505

DATE.....08-27-2002

TIME.....19:12:12

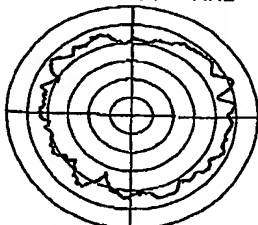
PATTERN.....004

REF = 10dBi

FRONT=0

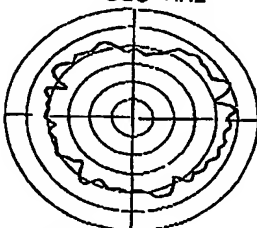
10 dB/DIV

889.4 MHz



Area Mean = -5.2
Std dB Dev = 3.2
M/M Ratio = 18.5

895 MHz



Area Mean = -7.1
Std dB Dev = 3.6
M/M Ratio = 17

Mean of Ind. Area Means...-3.9 dB
Std dB Dev of Area Means... .4 dB

UNIT TESTED... '03 CHEVROLET
Mfg./Model... TRAIL BLAZER
Antenna Type... TRI-BAND IRR
Comments... LUGGAGE CARRIER REMOVED

RF DETECTOR... SPECTRUM ANALYZER
Resolution BW... 100 KHz

RF SOURCE... LAB SIGNAL
Transmit Ant... JEF 50-1000 MHz XLP
Height... 10 Ft.

Mean of Ind. MM Ratios... 16.1 dB
Std dB Dev of M/M Ratios... 5.1 dB
Mean of Ind Std dB Dev's... 3.3 dB

ID Number.....
Ant. Location... PASSENGER SIDE ROOF RACK

Mfg./Model... Anritsu MS2601A
Detector Fn... Peak

Mfg./Model... Anritsu MH680A1
Polarization... VERTICAL
Range... 150 Ft.